

CORRESPONDENCE



Successful spontaneous breathing trial, early reintubation and mechanisms of weaning failure

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Dear Editor,

We read with great interest the elegant study recently published by the group of Goudelin et al. [1] where authors studied weaning from mechanical ventilation (MV) in a population with chronic-obstructive pulmonary disease (COPD) and/or heart failure with reduced ejection fraction (HFrEF). The authors confirmed that left ventricular (LV) overloading is a key aspect of weaning-induced pulmonary oedema (WiPO). As cardiovascular dysfunction accounts for the majority of weaning failures (WiPO quoted around 60% of failures by the largest published study) [2], the role of echocardiography is becoming prominent also in this context [3].

Weaning failure and prolonged MV are associated with longer intensive care unit stay, greater healthcare costs, increased morbidity and mortality [4]. The recent International Consensus Conference and WIND study [4] defined weaning failure as the occurrence of any of these: (a) failed spontaneous breathing trial (SBT); (b) reintubation/resumption of ventilator support within 48 h after extubation; or (c) death within 48 h after extubation. Therefore, the importance of extubation failure cannot be overemphasized and this seems rather logical as reintubation exposes patients to life-threatening complications. For these reasons, most studies on weaning from MV have included reintubation among the criteria for weaning failure (Table 1).

In this interesting study published in the journal [1], the authors showed that 47 out of 59 patients successfully

passed their first SBT, while 12 had failed. Noteworthy, four patients “passing the SBT” subsequently met the criteria of “extubation failure within 48 h”, but they were still analysed as “successful SBT”. In light of the above-mentioned international definition [4] and of the most common approach to define weaning failure, we ask the authors to provide data separating the study population in 43 patients (lasting successful SBT) vs 16 patients (12 SBT failure, 4 early reintubation).

Besides this request, we would like to applaud the authors for collecting data on all the five recently recommended parameters for the evaluation of LV diastolic dysfunction (LVDD), a very challenging task in the intensive care setting [5]. It would be interesting to investigate if the overall grading of LVDD was associated with weaning failure, since three parameters (*E* wave, *E/A* ratio and tricuspid regurgitant jet velocity) were significantly different between groups, while the other two (*e'* wave and *E/e'* ratio) were not.

Finally, the study population included a mixture of COPD and HFrEF patients [1], but they have different cardiovascular profiles on the systolic/diastolic function of both ventricles. A sub-group analysis may be very intriguing for readers as the mechanisms of weaning failure could be profoundly different. Simplifying, an increased venous return during the shift from positive to negative pressure ventilation may result in right ventricular dilatation, particularly in cases of already impaired or borderline function (likely in COPD). Similarly, weaning can be poorly tolerated by an already impaired LV (HFrEF) due to increased preload and also concomitant surge in afterload when SBT is commenced.

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Table 1 Criteria adopted by studies focusing on weaning failure from mechanical ventilation

First author, year, journal	Criteria for weaning failure
Caille et al. 2010, Crit Care	Failed SBT or reintubation within 48 h
Zapata et al. 2011, Intensive Care Med	Failed SBT or reintubation within 48 h
Papanikolaou et al. 2011, Intensive Care Med	Failed SBT or reintubation within 48 h
Gerbaud et al. 2012, Minerva Anestesiol	Failed SBT; do not report info on reintubation
Moschietto et al. 2012, Crit Care	Failed SBT or reintubation within 48 h
Thille et al. 2015, Crit Care Med	Failed SBT or reintubation within 7 days
Konomi et al. 2016, Anaesth Intensive Care	Failed SBT or reintubation within 48 h
Luo et al. 2017, BMC Pulm Med	Reintubation within 48 h or 7 days (in patients extubated after SBT)
Haji et al. 2018, Crit Ultrasound J	Failed SBT, or reintubation, NIV or death within 48 h
Tongyoo et al. 2018, Echocardiography	Failed SBT or reintubation within 48 h
Amarja et al. 2019, Indian J Crit Care Med	Reintubation within 48 h (in patients extubated after SBT)
Kaltsi et al. 2019, Crit Care Res Pract	Failed SBT; do not report info on reintubation
Bedet et al. 2019, Crit Care	Failed SBT or reintubation within 7 days or death

NIV: non-invasive ventilation; SBT: spontaneous breathing trial

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Author contributions

All the authors read and discussed the content of the article by Goudelin et al. in a journal club. FS wrote the draft with the initial idea of asking further analysis with a different criteria of classification. PM and VLR suggested to discuss also the possibility to analyse separately HFREF and COPD. FO and MA suggested to ask also if the overall grading of LVDD was associated with weaning failure. All the authors critically revised the final draft and approved.

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Compliance with ethical standards

Conflicts of interest

The authors declare that they have no conflict of interest.

Ethics approval

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Consent to participate

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Consent for publication

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Availability of data and material (data transparency)

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Code availability

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